

CLAIMS:

1. A method of laminating a first material having a point emboss pattern formed thereon, to a second material, by a lamination process using a point lamination pattern, wherein one or more characteristics of the two patterns is selected and differentiated to control, during lamination, the amount of point mis-registration between the two patterns.

Sub B1
10 2. A method according to Claim 1, wherein the selection and degree of differentiation between the one or more characteristics is arranged to maximise the amount of point mis-registration between the two patterns.

15 3. A method according to Claim 1, wherein the selection and degree of differentiation between the one or more characteristics is arranged to control the size of areas in the resultant laminate containing groups of adjacent points in each pattern which are in registration, in order to avoid the visual appearance of non-lamination effects such as blistering occurring in the resultant laminate.

Sub A1
20 4. A method according to any preceding claim, wherein the one or more selected characteristics include the pitch between emboss points or the lamination points.

Sub B1
5. A method according to Claim 4, wherein the emboss pattern pitch is variable and point lamination pattern pitch is fixed.

Sub A2
25 6. A method according to any preceding claim, wherein the one or more selected characteristics include the axes of alignment of the emboss points of the emboss pattern and of the lamination points of the lamination pattern.

Sub B2
7. A method according to Claim 6, wherein the axes are orthogonal to each other.

Sub A3
8. A method according to Claim 6 or 7, wherein the axes of emboss points are varied and axes of the lamination points are fixed.

Sub B10
Sub B11
Sub B12
Sub B13
Sub B14
Sub B15
Sub B16

9. A method according to any preceding claim, wherein the one or more selected characteristics ~~include~~ the percentage bond area of the emboss pattern or the percentage contact area of the point lamination pattern.

5 10. A method according to Claim 9, wherein percentage bond area of emboss pattern variable and ~~percentage contact area of point lamination pattern is fixed.~~

10 11. A method according to any preceding claim, wherein the one or more selected characteristics ~~include~~ the shape of each emboss point of the emboss pattern or each lamination point of the point lamination pattern.

12. A method according to Claim 11, wherein the shape of each emboss point is variable and shape of each lamination point is fixed.

13. A method according to any preceding claim, wherein the one or more selected characteristics ~~include the size of each emboss point of the emboss pattern or of each lamination point of the point lamination pattern.~~

14. A method according to Claim 11, wherein the size of each emboss point is variable and size of each lamination point is fixed.

15. A method according to any preceding claim, wherein the weight of the first material is greater than or equal to 50 g/m².

25 16. A method according to any preceding claim, wherein the weight of the second material is less than 50 g/m²

30 17. A method according to any preceding claim, further comprising providing a thermoplastic adhesive layer between the first and second materials during the lamination process.

18. A method according to Claim 17, wherein the adhesive layer is provided as a coating on one of said first and second materials.

SUB 16

19. A method according to Claim 18, wherein the coating is substantially continuous but provides discreet adhesive bonding points between the first and second materials at the lamination points during the point lamination process.

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Sub A1

20. ~~A method according to any of Claims 17 to 19, wherein the first material has a chemical composition which is unsuitable for bonding to the second material by heat and pressure alone.~~

10 21. A method according to any of Claims 17 to 20, wherein the first material comprises a thermoplastic polymer and the lamination is implemented by an embossed thermobonding calender.

SUB 15

22. A method according to Claim 21, wherein the lamination comprises passing the thermoplastic adhesive layer and the polymer layer through the thermobonding calender such that they are caused to melt together to form an integrated bond.

23. A method according to Claim 22, wherein the second material comprises a thermoplastics material and is also caused to melt to form part of the integrated bond.

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Sub A2

24. A method according to Claim 21 or 22, wherein the second material comprises a woven fabric textile material.

25 25. A method according to any of Claims 21 to 24, further comprising selecting the lamination conditions to melt the thermoplastic adhesive layer in a single pass through the thermobonding calender and subsequently to cool the laminate to set the melted adhesive.

30 26. A method according to any of Claims 17 to 25, wherein the adhesive is one or more of an acrylic adhesive, a hot melt adhesive, a netting adhesive or a powder adhesive.

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27. A method according to any of Claims 17 to 26, wherein the first and/or second materials comprise discontinuous fibres which are melted by the lamination process to form a film at the adhesive lamination points.

5 28. A method according to any preceding claim, further comprising coating the first material, the second material or the laminate with a chemical composition to impart specific properties to the laminate.

10 29. A method according to any preceding claim, wherein the first material comprises a nonwoven spunbonded textile.

30. A method according to Claim 29, wherein the first material comprises a thermobonding polymer such as polypropylene, polyethylene, polyester or polyamide.

15 31. A method according to any preceding claim, wherein the second material comprises a thin film.

32. A method according to Claim 31, wherein the second material comprises a thermobonding polymer such as polypropylene, polyethylene, polyester or polyamide.

20 33. A method according to any preceding claim, further comprising providing a further layer between first and second materials.

25 34. A method according to Claim 33, wherein the further layer is a microfibre layer, a non-plastics fabric or a continuous thin film.

30 35. A method according to any preceding claim, wherein the lamination is effected by use of a thermobonding calender, the first material has an emboss pattern which is non-symmetrical about a line transverse to an axis of rotation of the calender, and the first material can be reversed in orientation to present an emboss pattern having different pattern characteristics to that presented when the first material is not reversed.

36. A method according to Claim 35, further comprising reversing the first material prior to the lamination.

✓ A9
37. A method according to Claim 35 or 36, wherein the reversed embossed pattern is 5 sufficiently different to the non-reversed embossed pattern to provide under the same process conditions a different pressure distribution across the laminate.

✓ Sub B21 10
38. A method according to Claim 37, wherein the difference in pressure distributions leads to perforation of the laminate when the first material is reversed and non-perforation when it is not reversed in orientation.

✓ b10
39. An apparatus for laminating a first material having an emboss pattern formed thereon, to a second material, the apparatus comprising a lamination means for bonding said first and second materials together at discreet points, wherein the lamination means provides a 15 point lamination pattern having one or more of its characteristics selected to be different to a corresponding one or more characteristics of the emboss pattern so as to control, during lamination, the amount of point mis-registration between the two patterns.

40. An apparatus according to Claim 39, wherein the first and second materials are 20 continuous sheets of material and the apparatus is arranged to form a continuous laminate.

41. An apparatus according to Claim 40, wherein the materials are arranged as wound 25 rolls of material and the apparatus comprises means for unwinding and flattening the materials prior to lamination.

✓ A11
42. An apparatus according to any of Claims 39 to 41, wherein the lamination means comprises an embossed thermobonding calender.

43. An apparatus according to any of Claims 39 to 42, wherein the apparatus further 30 comprises means for cooling the laminate after the lamination process.

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44. An apparatus according to any of Claims 39 to 43, wherein the apparatus further comprises means for treating the laminated material with a chemical composition after the lamination process.

5 45. A method of point bonding two lamina together, the method comprising:
selecting an emboss pattern, which is applied to one of the lamina,
selecting a point bonding pattern, which is to be used for bonding the two lamina together, and
point bonding said two lamina together using said point bonding pattern,
10 wherein said selection steps are arranged to differentiate a characteristic of the two patterns to establish a predetermined amount of point mis-registration between the two patterns.

46. A method of laminating a first polymer material to a second material by use of a
15 thermoplastic adhesive layer, wherein the thermoplastic adhesive layer, the first polymer material layer and the second material layer are passed through a point lamination calender and at least the adhesive and thermobonding layer are caused to melt together at the lamination points to form respective integrated bonds.

20 47. A method according to Claim 46, wherein the second material comprises a woven fabric textile material.

48. A method according to Claim 46, wherein the second material comprises a thermoplastics material and is also caused to melt to form part of the integrated bond.

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49. A method according to any of Claims 46 to 48, further comprising selecting the lamination conditions to melt the thermoplastic adhesive layer in a single pass through the thermobonding calender and subsequently to cool the laminate to set the melted adhesive.

30 50. A method according to any of Claims 46 to 49, further comprising applying the adhesive layer as a coating to one of the first or second materials.

51. A method according to Claim 50, wherein the applied coating is substantially continuous but provides discreet adhesive bonding points between the first and second materials at the lamination points during the point lamination process.

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✓ A3 52. A method according to any of Claims 46 to 51, wherein the adhesive is one or more of an acrylic adhesive, a hot melt adhesive, a netting adhesive or a powder adhesive.

53. A method according to any of Claims 46 to 52, wherein the first and/or second materials comprise discontinuous fibres which are melted by the lamination process to form a film at the adhesive lamination points.

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